



# UNITED STATES PATENT AND TRADEMARK OFFICE

3-1  
UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/062,192	02/01/2002	Silviu Borac	MENT-062	9408

7590 11/10/2003

Richard A. Jordan  
P.O. Box 81363  
Wellesley Hills, MA 02481-0004

EXAMINER
----------

NGUYEN, KIMBINH T

ART UNIT	PAPER NUMBER
----------	--------------

2671

DATE MAILED: 11/10/2003

5

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/062,192

Applicant(s)

BORAC, SILVIU

Examiner

Kimbinh T. Nguyen

Art Unit

2671

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 February 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-156 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7,53-59 and 105-111 is/are rejected.
- 7) ☒ Claim(s) 8-52,60-104 and 112-156 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

### DETAILED ACTION

1. Claims 1-156 are pending in the application.

#### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-5 and 7, 53-57 and 59, 105-109 and 111 are rejected under 35 U.S.C. 103(a) as being unpatentable over Litke et al. (6,603,473).

**Claim 1**, Litke et al. discloses a mesh representation comprising points connected to neighbor points by edges, the feature (mesh) being defined in connection with vertex and neighboring points and the edge (col. 4, line 55 through col. 5, line 2); generating a weight vector based on a parameterized subdivision rule defined at levels (col. 2, lines 45-53; col. 6, lines 25-58; col. 11, lines 40-50) for which a value of parameter differs at two levels in the mesh ( $j=0$  and  $j>0$  or coarser level and finer level in the mesh; col. 3, lines 8-15); using weight vector and position of the vertex and neighboring points to generate the representation (the weight vectors are summed to arrive at detail vector for the vertex; col. 11, lines 53-55). Litke does not teach using weight vector to generate the representation of the feature (mesh); however, Litke teaches using the results summed to arrive at the detail for the vertex (col. 3, lines 16-

Art Unit: 2671

33). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use weight vector, position of the vertex and neighboring points to generate representation of the feature (mesh), because the detail data provides information about the object surface, the mesh representation with this detail data, a more accurate representation of the object surface results (col. 2, lines 29-32).

**Claim 2**, Litke et al. discloses values of parameter that differs at two levels are related by a selected mathematical function (col. 6, lines 25-43).

**Claims 3 and 4**, Litke et al. discloses the feature is a smooth feature line (col. 1, lines 55-56; col. 14, lines 30-42); the smooth feature line is defined in connection with vertex and two neighboring points and edges, the weight vector having a parameter value associated with edges along the smooth feature line is defined (assuming all detail vectors are set to zero; col. 14, lines 30-42).

**Claims 5 and 7**, Litke et al. teaches the weight vector (suitable weight) to make use of parameters associated with the edges along the smooth feature whose values are defined the same (zero weight; col. 11, lines 12-16), whose values differ (col. 11, lines 3-9).

**Claims 53-57, 59, 105-109, 111**, the rationale provided in the rejection of claims 1-5 and 7 is incorporated herein.

4. Claims 6, 58, 110 are rejected under 35 U.S.C. 103(a) as being unpatentable over Litke et al. (6,603,473) in view of Levin "Interpolating Nets Of Curves by Smooth Subdivision Surfaces", ACM 1999, pages 57-64.

**Claims 6, 58 and 110**, Levin teaches the parameters that are related to a subdivision rule reflects a sharp crease along the edges which the smooth feature line is defined (see conclusions, page 61). It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the step 3 of subdivision schemes as taught by Levin into the method for determining the weight vector as disclosed by Litke's teaching to provide a crease along the edges of the smooth surface, because it would provide efficient algorithms for design, representation and processing of smooth surfaces of arbitrary topological type (see Introduction, page 57).

#### ***Allowable Subject Matter***

5. Claims 8-52, 60-104, 112-156 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

The prior art does not teach the parameters that are related to a subdivision rule reflects a sharp crease along the edges which the smooth feature line is defined, the values of parameters being defined in the interval  $[0,1]$ , where higher values define a sharper crease, the values of the parameters at lower level being related to the values at a higher level related by the claimed equations.

#### ***Conclusion***

Art Unit: 2671

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Stam (6,389,154) teaches exact evaluation of subdivision surfaces generalizing box splines at arbitrary parameter values.
- Krishnamurthy (6,256,038) discloses parameterized surface fitting technique having independent control of fitting and parameterization.
- DeRose et al. (6,222,553) discloses hybrid subdivision in computer graphics.
- Loop (5,602,979) discloses system and method for generating smooth low degree polynomial spline surfaces over irregular meshes.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Kimbinh Nguyen** whose telephone number is **(703) 305-9683**. The examiner can normally be reached **(Monday- Thursday from 7:00 AM to 4:30 PM and alternate Fridays from 7:00 AM to 3:30 PM)**.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Zimmerman, can be reached at (703) 305-9798.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

Or faxed to:

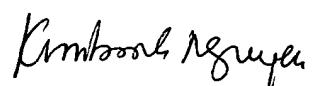
**(703) 872-9314 (for Technology Center 2600 only)**

Art Unit: 2671

Hand-delivered responses should be brought to Crystal Part II, 2121 Crystal Drive,  
Arlington, VA, Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or  
proceeding should be directed to the Technology Center 2600 Customer Service Office  
whose telephone number is (703) 306-0377.

October 30, 2003

A handwritten signature in black ink, appearing to read "Kimbinh Nguyen".

Kimbinh Nguyen

Patent Examiner AU 2671